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WATER SUPPLY OUTLOOK FOR ARIZONA



FROM THE SECTION
CURRENT SERIAL RECORDS

MAR 11 '76

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U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE

Collaborating with

SALT RIVER VALLEY WATER USERS ASSOCIATION

and

ARIZONA WATER COMMISSION

Data included in this report were obtained by the agencies named above in cooperation with Federal, State and private organizations listed inside the back cover of this report.

AS OF
MAR. 1, 1976

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: SURVEYOR ENROUTE TO THE MT. BALDY ARIZONA SNOW COURSE
SCS PHOTO AZ-5460

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 111, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	204 E. 5th. Ave., Room 217, Anchorage, Alaska 99501
Arizona	6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82601

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



WATER SUPPLY OUTLOOK FOR ARIZONA

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Issued by

R. M. DAVIS
ADMINISTRATOR
SOIL CONSERVATION SERVICE
WASHINGTON, D. C.

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SOIL CONSERVATION SERVICE
PHOENIX, ARIZONA

In Cooperation with

WESLEY E. STEINER
EXECUTIVE DIRECTOR
ARIZONA WATER COMMISSION

KARL F. ABEL
PRESIDENT
SALT RIVER VALLEY WATER
USERS ASSOCIATION

|||||

Report prepared by

RICHARD W. ENZ, Snow Survey Supervisor

SOIL CONSERVATION SERVICE
ROOM 6029 FEDERAL BUILDING
PHOENIX, ARIZONA 85025



Oversnow machine at Sheep Crossing

ARIZONA SUMMARY

as of

MARCH 1, 1976

NEAR NORMAL WATER SUPPLIES ARE NOW PREDICTED FOR MOST OF ARIZONA THIS YEAR. RESERVOIR STORAGE IS CLOSE TO AVERAGE AND RUNOFF IS GENERALLY EXPECTED TO BE NEAR NORMAL.

SNOW COVER

Snow cover ranges from 34% above average on the Verde Watershed to 27% below on the Gila, with the Salt and Little Colorado near normal. Most of the snow below 7000' has melted, but above 7500' (with the exception of the Gila Watershed) there is a good snow pack. The heaviest relative snow cover is found on Mormon Mountain and on the "Rim" at Baker Butte where conditions are twice normal.

PRECIPITATION

Extremely heavy precipitation occurred during February with amounts of 2 to 3 times normal common on the Verde and Salt Watersheds. Some of the heaviest amounts were received at Crown King with 11.57; Camp Wood, 10.70; Baker Butte, 10.07; Mormon Mountain, 8.30; Workman Creek, 8.30; Canyon Point, 8.03; White Horse Lake, 8.00; and Copper Basin Divide, 7.68. Almost all of this precipitation occurred during the first half of the month.

Total winter precipitation since November 1 has been near normal on the Salt and Little Colorado Watersheds, 20% above average on the Verde, and 15% below on the Gila.

SOIL MOISTURE

Rain and melting snow has resulted in good soil moisture at the lower and intermediate elevations. Good runoff can be expected from normal precipitation in March and April.

RESERVOIR STORAGE

Salt River Project reservoirs, now containing 62% of capacity, are above average for this date. The net increase in storage of 260,000 acre-feet is five times average for February. San Carlos and Lake Pleasant Reservoirs also received good inflow, but are still somewhat below average.

STREAMFLOW AND WATER SUPPLY

Warm rains and melting snow resulted in the heaviest February runoff since 1937 on Tonto Creek and since 1941 on the Verde River. The Salt and Gila Rivers also greatly exceeded their normal flows for February.

Streamflow forecasts for the March through May period range from 21% above average for the Verde to about 25% below average for the Salt and Gila.

Water supplies should be adequate this year in Arizona if normal precipitation continues throughout the season.

ABOUT MARCH 1,
1976

STREAMFLOW FORECASTS

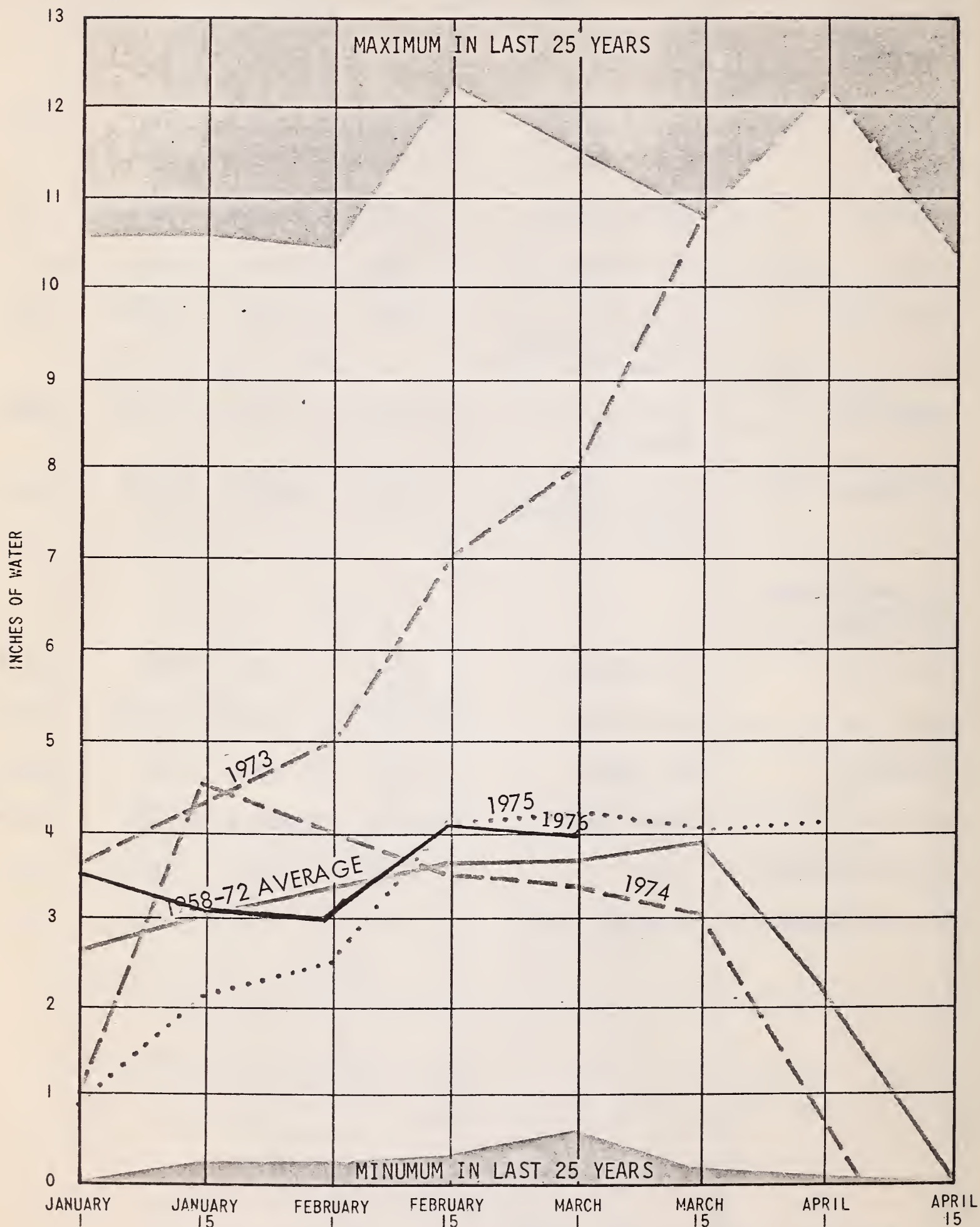
STREAMFLOW FORECASTS		1976		THIS YEAR		PAST RECORD	
BASIN, STREAM and/or FORECAST POINT		FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET		
		Thousand Acre Feet	Percent of Average		Last Year	Average †	
<u>SALT RIVER DRAINAGE</u>							
Salt near Roosevelt		175	78	Mar-May	404.3	224.6	
Salt near Roosevelt		67	82	March	132.4	81.9	
Tonto Creek near Roosevelt		25	108	Mar-May	42.2	23.1	
Tonto Creek near Roosevelt		15	102	March	15.9	14.7	
Verde River above Horseshoe		138	121	Mar-May	151.6	114.4	
Verde River above Horseshoe		87	144	March	58.4	60.4	
Total Salt River Project Streams		338	93	Mar-May	598.1	362.1	
<u>GILA RIVER DRAINAGE</u>							
Gila River at Calva		34	62	Mar-May	62.9	54.9	
Gila River near Gila		35	91	Mar-May	60.5	38.3	
Gila River near Solomon		70	77	Mar-May	129.9	90.5	
Gila River near Solomon		35	76	March	54.9	46.2	
Gila River near Virden		37	80	Mar-May	66.7	46.0	
Frisco River at Clifton		34	72	Mar-May	67.7	46.9	
Frisco River at Glenwood		15	73	Mar-May	36.5	20.6	
<u>LITTLE COLORADO RIVER DRAINAGE</u>							
Little Colo. River above Lyman Dam		5.4	55	Mar-June	16.4	9.8	
Greer 1/		5.6	85	Mar-June	---	6.6	
Lake Mary Inflow		4.2	114	Mar-May	5.8	3.7	
<u>GRANITE CREEK DRAINAGE</u>							
Granite Creek		2.1	---	Mar-May	---	---	
Willow Creek		.8	---	Mar-May	---	---	
<u>MIMBRES RIVER DRAINAGE</u>							
Mimbres River near Mimbres		2.0	65	Mar-May	7.2	3.1	
<u>COLORADO RIVER DRAINAGE</u>							
Virgin River nr. Littlefield		39	90	Apr-June	22.5	43.2	
The Gila River near Solomon is expected to flow above 100 cfs until May 1.							
1/ Corrected for Filler Ditch Diversion							
† Based on 15-year period, 1958-72							
* Average is for less than 15 years							

RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH

ABOUT MARCH 1, 1976

BASIN or STREAM	RESERVOIR	Usable Capacity	Usable Storage		
			This Year	Last Year	Average†
<u>GILA RIVER DRAINAGE</u>					
Agua Fria	Lake Pleasant	157.6	50.6	56.4	61.0
Granite	Watson Lake	4.7	4.5	1.5	3.1
Granite	Willow Creek	6.1	2.6	0.9	2.9
Gila	San Carlos	1,093	131.7	252.2	190.5
Salt (4)	Roosevelt, Apache, Canyon, & Saguaro	1,755	1129.4	1,040	1,109
Verde (2)	Bartlett & Horseshoe	317.7	160.7	47.8	145.1
Salt and Verde	6 Salt River Project Reservoirs	2,073	1290.1	1,088	1,254
<u>COLORADO RIVER DRAINAGE</u>					
Colorado	Lake Havasu	619.4	537.5	551.0	539.2
Colorado	Lake Mohave	1,810	1680.7	1,657	1,689
Colorado	Lake Mead	26,159	20,528.0	19,928	17,224
Colorado	Lake Powell	25,002	19,838.0	17,199	7,347*
Little Colorado	Lyman	30.6	21.2	11.6	13.4
Little Colorado	Show Low Lake	5.1	1.8	0.8	2.0
† Based on 15-year period, 1958-72					
* Average is for less than 15 years of record					

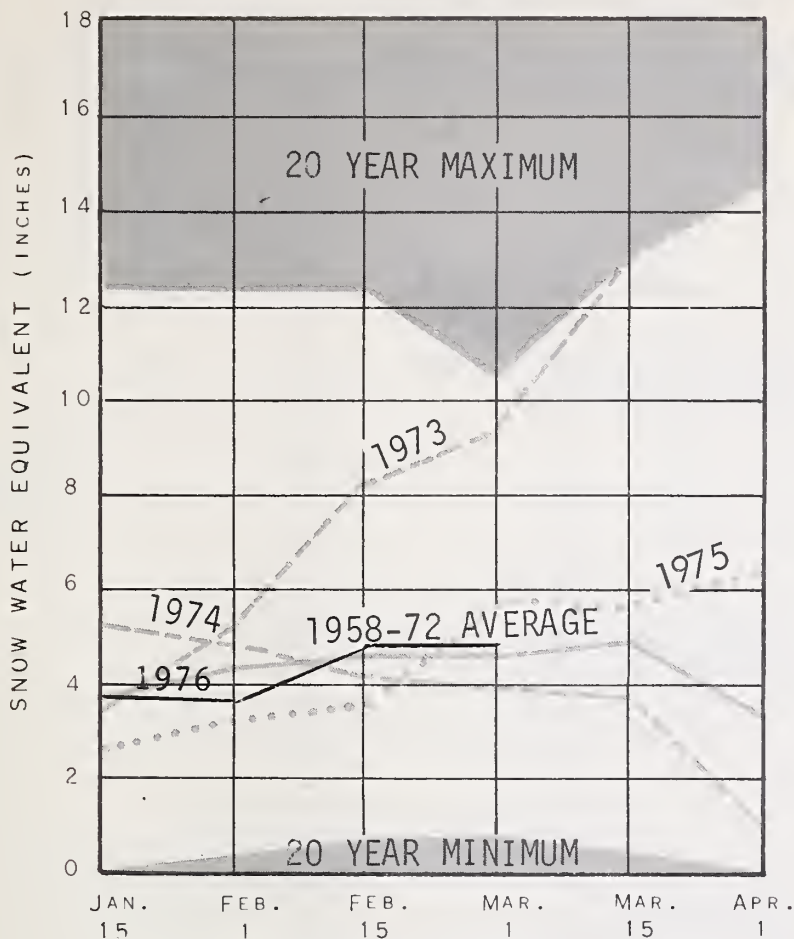
AVERAGE SNOW COVER ARIZONA 1976



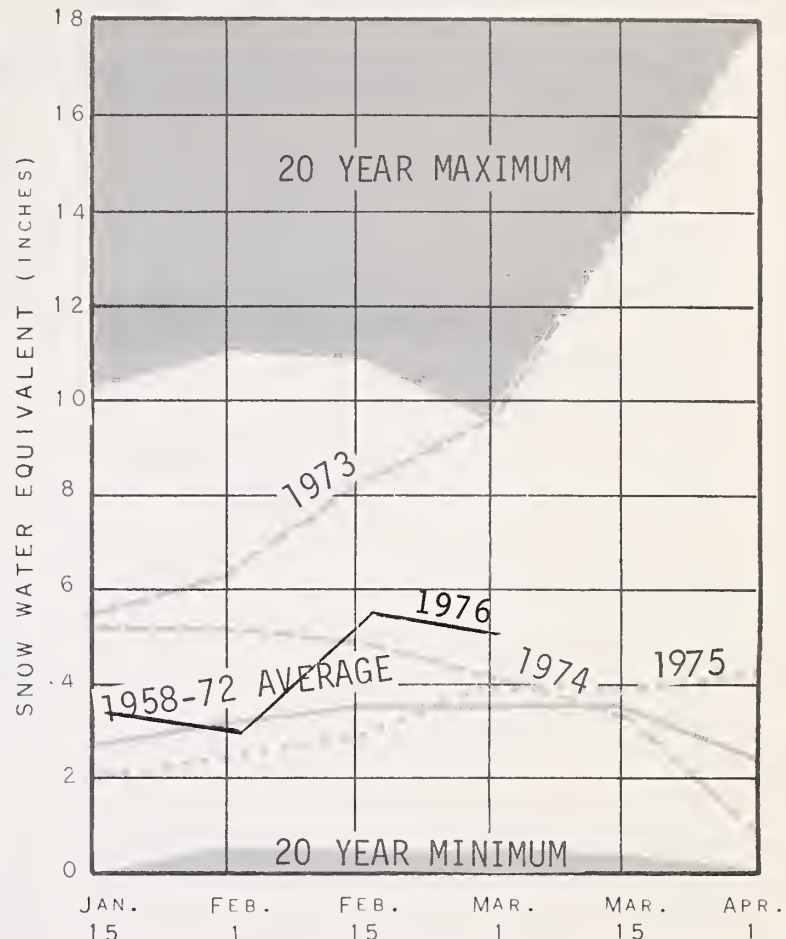
This graph represents the average snow water content on eleven selected snow courses on Arizona Sub-Watersheds.

1976

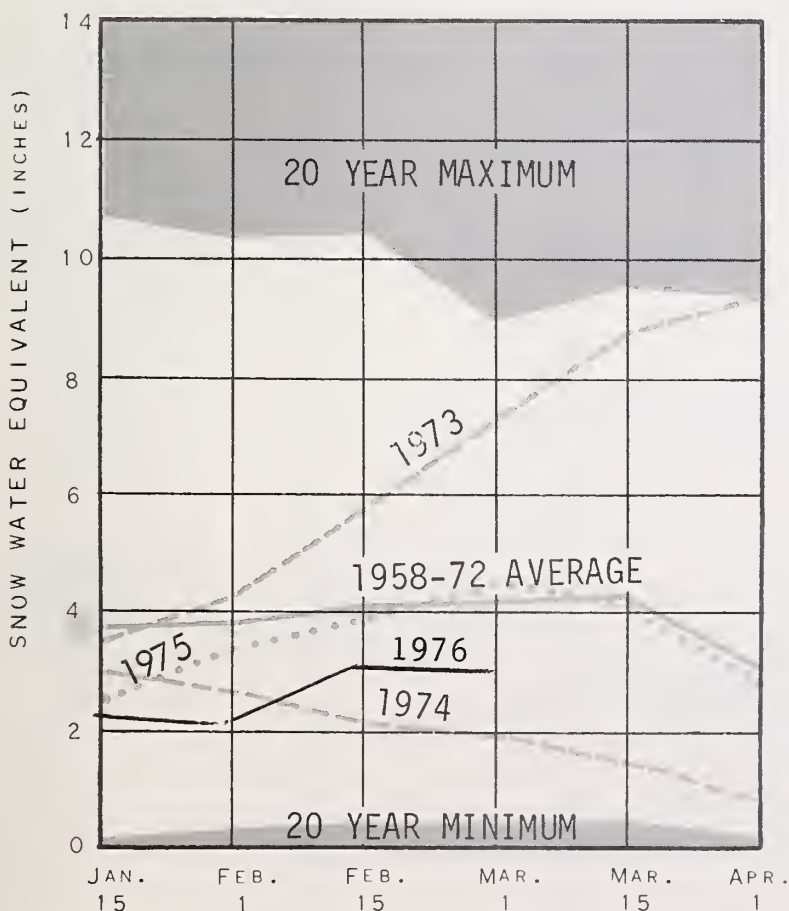
WATERSHED SNOW COVER



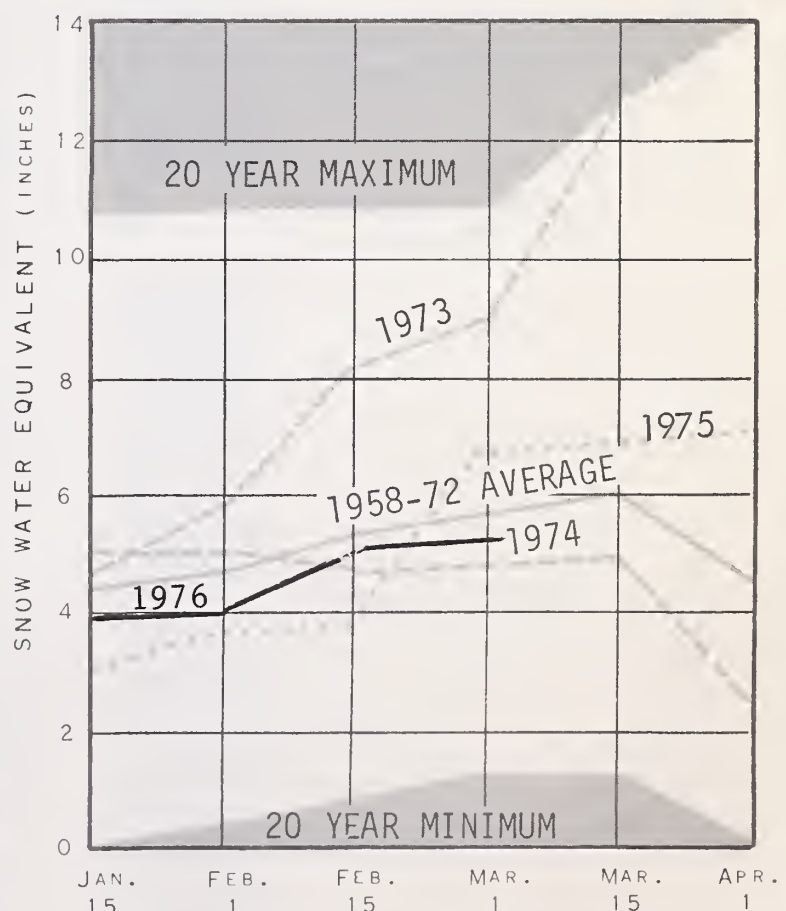
SALT RIVER



VERDE RIVER



GILA RIVER



LITTLE COLORADO RIVER

WATER SUPPLY INVENTORY SALT RIVER VALLEY SYSTEM

IN ACRE-FEET
MARCH 1, 1976

AVERAGE SUPPLY
ON MARCH 1

ANTICIPATED 1976
SUPPLY *

3,000,000

2,500,000

2,000,000

1,500,000

1,000,000

500,000

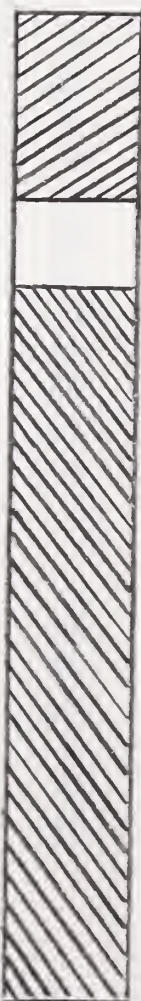
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Average Spring
Runoff

Average Summer
Runoff

Average
Storage



Forecast Runoff
(March-May)

Average Summer
Runoff

Present Storage

Based on Present Storage + Forecast Spring Runoff + Average Summer Runoff

SNOW ABOUT MARCH 1, 1976

DRAINAGE BASIN and/or SNOW COURSE		THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Elevation				Last Year	Average †
GILA RIVER						
Bear Wallow	8100	D E L A Y E D			1.7	4.6
Beaver Head	8000	2/27	3	1.2	2.6	2.6
Coronado Trail	8000	2/27	1	0.3	3.8	2.6
Emory Pass #1 *	7800	2/27	0	0.0	0.0	0.0**
Emory Pass #2 *	7800	2/27	0	0.0	1.0	0.5**
Frisco Divide	8000	2/27	3	0.9	3.5	2.2
Hannagan Meadows *	9090	2/27	29	9.5	9.0	7.9**
Hummingbird (A)	10550	2/27	36	12.0	13.5	13.8**
McKnight Cabin * (A)	9300	M A R K E R		D O W N	4.5	3.2**
Mogollon	7000	2/27	0	0.0	0.0	1.4
Nutrioso	8500	2/27	3	0.8	3.3	1.7
Redstone Trail	8600	3/1	18	5.8	7.1	7.7**
Rose Canyon	7300	2/27	0	0.0	0.0	2.4
Silver Creek Divide	9000	3/1	25	8.6	10.4	11.4**
State Line	8000	2/27	2	0.7	3.1	2.1
Whitewater (A)	10750	2/27	54	15.1	16.4	17.7**
VERDE RIVER						
Baker Butte	7300	2/27	24	9.6	5.0	5.3**
Baker Butte #2	7700	2/27	42	17.3	10.8	---
Camp Wood	5700	2/27	0	0.0	0.0	0.5
Chalender *	7100	2/27	10	3.9	2.2	2.3
Copper Basin Divide	6720	2/27	T	T	0.2	1.2**
Fort Valley	7350	2/27	1	0.4	1.4	2.0
Gaddes Canyon	7600	2/28	21	7.2	3.8	4.7
Happy Jack	7630	2/27	9	3.4	3.9	3.0
Iron Springs *	6200	2/27	0	0.0	0.0	0.3
Mingus Mountain	7100	2/28	0	0.0	0.0	0.9
Mormon Lake *	7350	2/27	19	6.8	5.3	3.2
Mormon Mountain	7500	2/27	21	8.6	6.4	4.3
Newman Park	6750	2/27	2	1.0	3.0	1.4**
Snow Bowl #1	10260	2/27	32	9.1	9.8	8.9**
Snow Bowl #2	11000	2/27	50	14.2	12.8	15.7**
White Horse Lake Jct.	7150	2/27	11	4.4	2.5	3.0**
White Spar	6000	2/27	0	0.0	0.0	0.5**
LOWER COLORADO RIVER						
Bill Williams Intermediate	8550	2/27	33	11.8	6.8	7.0**
Bill Williams Summit	8950	2/27	45	15.7	9.6	11.0**
Chalender *	7100	2/27	10	3.9	2.2	2.3
Fort Valley	7350	2/27	1	0.4	1.4	2.0
Grand Canyon	7500	2/27	0	0.0	2.4	1.5
Williams Ski Run	7720	2/27	32	11.8	7.5	5.6**
† 1958-72 15-year period. (*) Adjacent drainage. (**) 1958-72 Adjusted Average. (A) Aerial observation; Water content estimated.						

SNOW

ABOUT MARCH 1, 1976

SNOW		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Elevation				Last Year	Average †
SALT RIVER						
Baldy *	9125	2/27	26	8.1	7.8	6.8
Beaver Head	8000	2/27	3	1.2	2.6	2.6
Canyon Creek	7500	2/27	9	3.8	3.4	3.0
Canyon Point	7600	2/27	9	3.8	4.6	3.6**
Coronado Trail	8000	2/27	1	0.3	3.8	2.6
Forest Dale	6430	2/27	0	0.0	1.0	0.6
Ft. Apache	9160	2/27	23	7.4	8.4	7.6
Hannagan Meadows	9090	2/27	29	9.5	9.0	7.9**
Hawley Lake	8300	2/27	20	7.5	9.0	6.2**
Heber	7600	2/27	7	2.9	4.0	3.3
Maverick Fork	9050	2/27	34	10.4	9.2	8.2
McNary	7200	2/27	3	1.0	3.6	2.1
Milk Ranch	7000	2/27	0	0.0	1.5	0.9
Mt. Ord (A)	11000	2/18	63	18.3	---	21.0**
Nutriosos *	8500	2/27	3	0.8	3.3	1.7
Promontory Butte	7930	2/27	40	14.7	10.3	---
Smith Cienega (A)	9850	2/18	48	13.9	19.5	---
Sunrise Summit	10600	2/27	44	12.8	13.9	---
Wilson Lake	9000	2/26	31	9.1	10.4	10.3**
Workman Creek	6900	2/23	16	6.6	5.2	4.8
LITTLE COLORADO RIVER						
Baldy	9125	2/27	26	8.1	7.8	6.8
Canyon Creek	7500	2/27	9	3.8	3.4	3.0
Canyon Point	7600	2/27	9	3.8	4.6	3.6**
Cheese Springs	8600	2/26	21	6.8	7.4	8.0**
Forest Dale	6430	2/27	0	0.0	1.0	0.6
Ft. Apache	9160	2/27	23	7.4	8.4	7.6
Fort Valley	7350	2/27	1	0.4	1.4	2.0
Happy Jack *	7630	2/27	9	3.4	3.9	3.0
Heber	7600	2/27	7	2.9	4.0	3.3
Inner Basin #1	10100	D E L A Y E D			13.7	17.4**
Inner Basin #2	9750	D E L A Y E D			7.5	11.0**
Lake Mary	6970	2/27	12	4.9	---	---
McNary	7200	2/27	3	1.0	3.6	2.1
Mormon Lake	7350	2/27	19	6.8	5.3	3.2
Mormon Mountain	7500	2/27	21	8.6	6.4	4.3
Nutriosos *	8500	2/27	3	0.8	3.3	1.7
Promontory Butte	7930	2/27	40	14.7	10.3	---
Snow Bowl #1	10260	2/27	32	9.1	9.8	8.9**
Snow Bowl #2	11000	2/27	50	14.2	12.8	15.7**
Wilson Lake	9000	2/26	31	9.1	10.4	10.3**
† 1958-72 15-year period. (*) Adjacent drainage. (**) 1958-72 Adjusted Average. (A) Aerial observation: Water content estimated.						

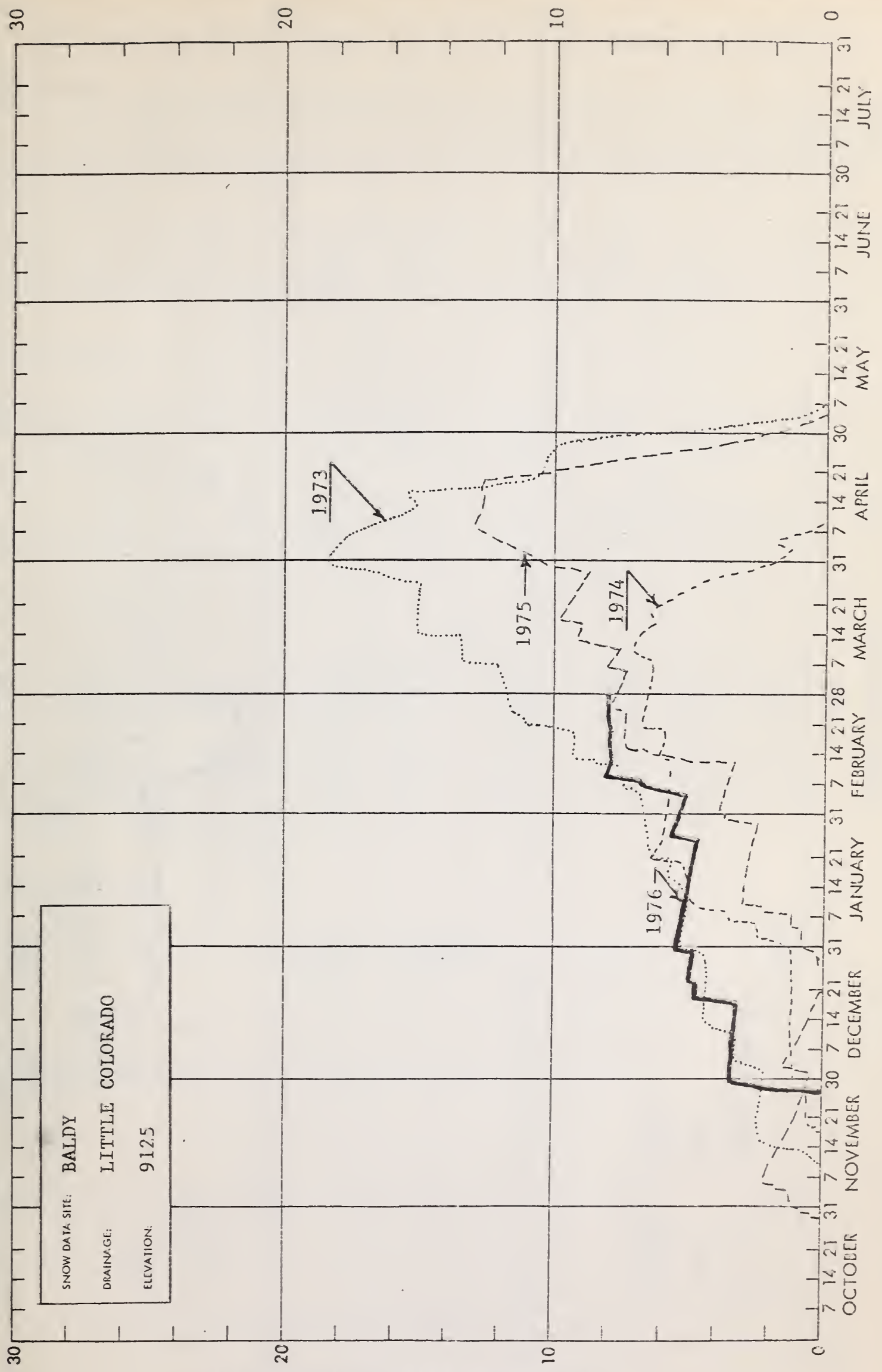
SNOW PILLOW DATA

WSFB-X13C

1976

SNOW DATA SITE: BALDY
DRAINAGE: LITTLE COLORADO
ELEVATION: 9125

INCHES OF WATER IN SNOWPACK

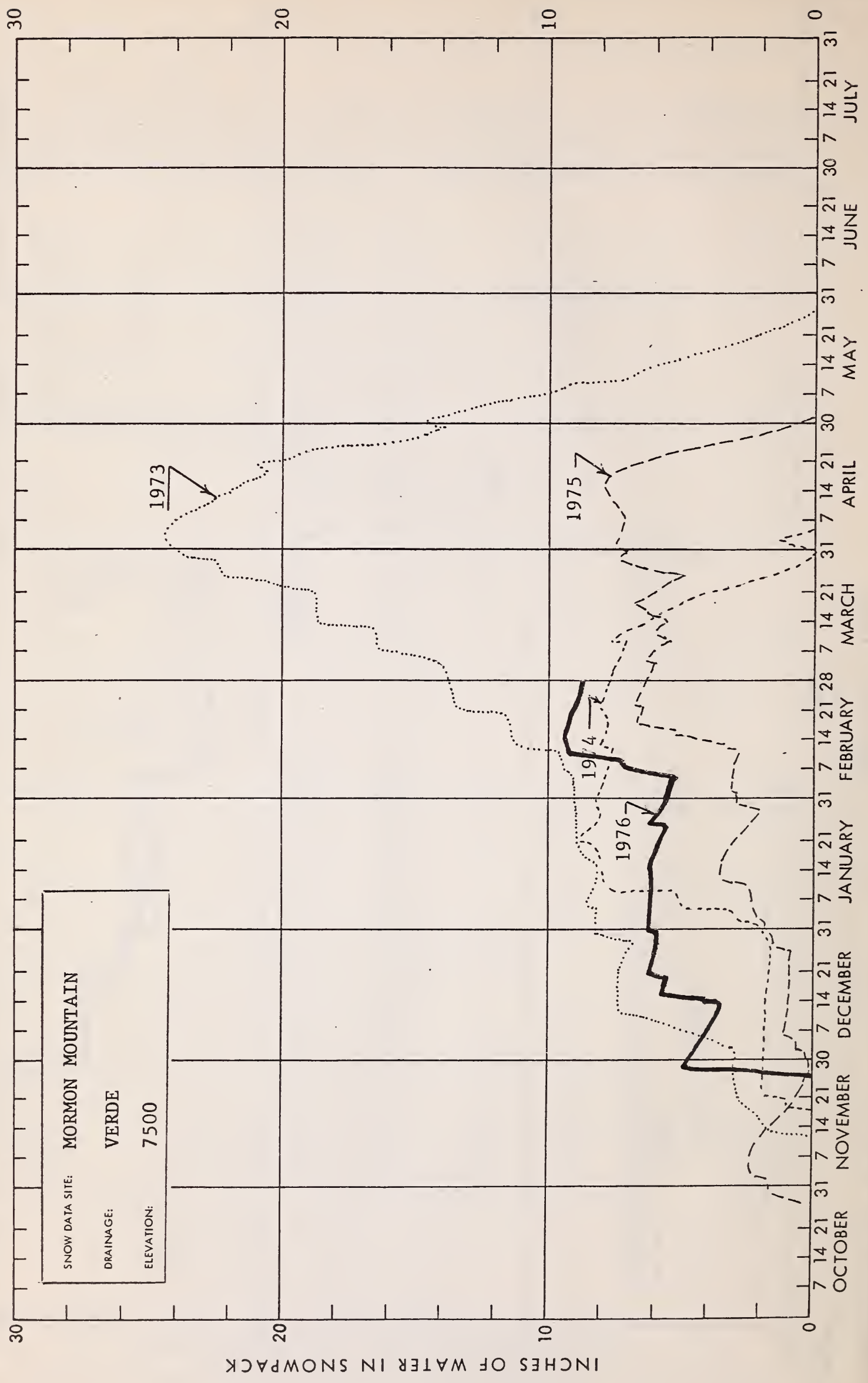


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SNOW PILLOW DATA

WSFB-X138

1976



SNOW DATA SITE: MORMON MOUNTAIN
 DRAINAGE: VERDE
 ELEVATION: 7500

PRECIPITATION (Inches) ABOUT MARCH 1, 1976

DRAINAGE BASIN and PRECIPITATION GAGE LOCATION	ELEVATION	CURRENT INFORMATION			FROM APPROX. NOV. 1 TO DATE		
		Date of Reading	Month's Precipitation	Average †	This Year	Average †	Percent of Average
<u>GILA RIVER</u>							
Silver Creek Divide	9000	2/28	4.90	2.16*	10.15	11.82*	
Hannagan Meadows **	9030	2/27	4.20	2.09	9.10	10.59	86
Frisco Divide **	8000	2/27	3.05	---	5.59	---	---
<u>SALT RIVER</u>							
Canyon Point	7600	2/27	8.03	2.52*	15.31	13.50*	113
Hannagan Meadows **	9030	2/27	4.20	2.09	9.10	10.59	86
Little Wildcat (Heber Snow Course)	7600	2/27	6.96	2.16	14.42	11.50	125
Maverick Fork	9050	2/27	4.50	2.07	11.03	10.02	110
Workman Creek **	6970	2/23	8.30	2.82	16.07	14.28	113
Wilson Lake	9100	2/26	3.10	2.31*	9.59	10.49*	91
<u>VERDE RIVER</u>							
Baker Butte	7300	2/27	10.07	2.86*	16.22	13.95*	116
Copper Basin Divide	6720	2/27	7.68	2.31*	12.45	9.09*	137
Fort Valley **	7350	2/27	3.80	1.60	6.95	7.02	99
Happy Jack **	7480	2/27	5.81	2.22	10.26	9.10	112
Mingus Mountain	7660	2/28	5.75	2.30	10.27	7.86	131
Mormon Mountain	7500	2/27	8.30	2.98*	16.64	13.15*	127
White Horse Lake Jct.**	7150	2/27	8.00	---	12.74	---	---
<u>LITTLE COLORADO</u>							
Inner Basin #1	9830	NO REPORT		2.64		12.83	
Inner Basin #2	10050	NO REPORT		2.82*		14.67*	
Greer Lakes	8500	2/27	2.05	1.68	4.75	5.98	79
Little Wildcat (Heber Snow Course)	7600	2/27	6.96	2.16	14.42	11.50	125
Sheep Crossing (Baldy Snow Course)	9125	2/27	3.73	1.92	9.13	9.67	94
† 1958-72 Average * Adjusted Average ** Data Supplied by U.S. Forest Service							

SOIL MOISTURE ABOUT MARCH 1, 1976

DRAINAGE BASIN and/or STATION		Profile (Inches)		Date of Survey	Soil Moisture (Inches)		
Name	Elevation	Depth	Capacity		This Year	Last Year	Average †
<u>GILA RIVER</u>							
Frisco Divide	8000	48	13.3	2/27	11.5	11.8	10.5
<u>SALT RIVER</u>							
Black River Divide	9100	48	16.8	2/27	17.3	18.0	16.5
Canyon Creek	7500	48	18.3	2/27	18.1	17.6	16.0
Corduoy Creek	6000	36	13.5	2/27	14.6	9.5	9.7
McNary	7200	48	16.3	2/27	17.9	17.9	15.2
<u>VERDE RIVER</u>							
Mormon Mountain	7500	48	16.1	2/27	17.0	14.4	16.0
Newman Park	6750	48	17.7	2/27	19.5	17.9	17.1
† 1958-72 15-year average							

The Following Organizations Cooperate in the Arizona Snow Survey Work

FEDERAL

- Department of Agriculture
 - Soil Conservation Service
 - Forest Service
 - Apache Forest
 - Coconino Forest
 - Coronado Forest
 - Gila Forest
 - Kaibab Forest
 - Prescott Forest
 - Rocky Mountain Forest and Range Experiment Station
 - Tonto Forest
- Department of Commerce
 - NOAA, National Weather Service
- Department of Interior
 - Bureau of Reclamation
 - Region 111
 - Geological Survey
 - Arizona District
 - New Mexico District
 - Bureau of Indian Affairs
 - Fort Apache Reservation
 - San Carlos Irrigation Project
 - National Park Service
 - Grand Canyon National Park
- Gila Water Commissioner
 - Safford, Arizona

STATE

- Arizona Game and Fish Department
- Arizona State Parks Board
- Arizona Water Commission
- University of Arizona
 - Arizona Agricultural Experiment Station
 - Water Resource Research Center
 - Department of Watershed Management

MUNICIPAL

- City of Flagstaff

IRRIGATION PROJECTS

- Salt River Valley Water User's Association
 - Phoenix, Arizona
- San Carlos Irrigation and Drainage District
 - Coolidge, Arizona
- Maricopa County Municipal Water Conservation District

PRIVATE

- Southwest Forest Industries, Inc.
 - McNary, Arizona
- Fort Apache Indian Reservation
 - White Mountain Recreation Enterprises

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
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